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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Karl Lubitz

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EXAMINER

ROSENAU, DEREK JOHN

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/527,158	Applicant(s) LUBITZ ET AL.	
	Examiner Derek J. Rosenau	Art Unit 2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15-26 and 28-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 26 and 28-35 is/are allowed.
- 6) ☒ Claim(s) 15-19 and 21-25 is/are rejected.
- 7) ☒ Claim(s) 20 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claim 20 is objected to because of the following informalities: it appears that "the diffusion layer is for diffusing volatile components of the lead zirconate titanate" is intended to be "the diffusion layer is for volatile components of the lead zirconate titanate." Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 15-19 and 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Feral et al. (US 5703425) in view of Phillips (US 6476542), Inoue et al. (US 5438232), and Chandran et al. (US 20030127947).
4. With respect to claim 15, Feral et al. discloses a ceramic element (Fig 1) with at least one substantially homogenous piezoelectric layer (item 1), the piezoelectric layer having a plurality of partial piezoelectric layers (item 6) arranged one on top of the other (Fig 1), at least one electrode layer (item 2) being arranged on at least one surface section of the ceramic layer (Fig 1), at least one further electrode layer (item 2) being arranged on a further surface section of the ceramic layer such that the electrode layers are arranged opposite each other and the piezoelectric layer is arranged between the electrode layers (Fig 1), characterized in that at least one of the electrodes layers is

arranged between the piezoelectric layer and at least one further piezoelectric layer (Fig 1).

Feral et al. does not disclose expressly that the piezoelectric layers are ceramic layers, that the at least one electrode layers are buried by the at least one further ceramic layer, or that said further ceramic layer is a diffusion barrier layer.

Phillips teaches that the piezoelectric materials, PZT green ceramics and PVDF, are interchangeable, and that when used in layered configurations, PZT green ceramics is the preferred material (column 4, lines 32-47).

Inoue et al. teaches a piezoelectric device in which the outermost electrodes are buried by a further layer of ceramic material (Fig 1, item 3).

Chandran et al. teaches a piezoelectric device similar to those of Feral et al., Phillips, and Inoue et al., in which the method of manufacturing results in the further ceramic layers being diffusion barriers (Paragraph 18).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the additional ceramic layers of Inoue et al., ceramic piezoelectric material of Phillips, and the diffusion barrier of Chandran et al. with the piezoelectric device of Feral et al. for the benefits of providing protection against moisture and mechanical damage (column 2, lines 60-68 of Inoue et al.), to be able to more easily provide the preferred transformer configuration with layering (column 4, lines 39-42 of Phillips), and to improve the electrical properties of the device (Paragraph 18 of Chandran et al.).

5. With respect to claim 16, the combination of Feral et al., Phillips, Inoue et al., and Chandran et al. discloses the ceramic element according to claim 15. Phillips discloses that the ceramic material is selected from the group of green ceramics and/or sintered ceramics (column 4, lines 32-47 and 58-60).

6. With respect to claim 17, the combination of Feral et al., Phillips, Inoue et al., and Chandran et al. discloses the ceramic element according to claim 15. Feral et al. discloses that at least one of the partial ceramic layers has a partial layer thickness selected from the range $5\mu\text{m}$ to $250\mu\text{m}$ inclusive (column 2, lines 39-42).

7. With respect to claim 18, the combination of Feral et al., Phillips, Inoue et al., and Chandran et al. discloses the ceramic element according to claim 15. Feral et al. discloses that the ceramic layer has an overall layer thickness selected from the range $10\mu\text{m}$ to 5mm inclusive (column 2, lines 19-22 and 39-42). Feral et al. discloses a range of a few microns to 50 microns per partial layer, and 6 or 40 partial layers per ceramic layer. This results in a total thickness in the range of approximately $18\mu\text{m}$ ($3\mu\text{m} \times 6$ layers) to 2mm ($50\mu\text{m} \times 40$ layers).

8. With respect to claim 19, the combination of Feral et al., Phillips, Inoue et al., and Chandran et al. discloses the ceramic element according to claim 16. Phillips discloses that the ceramic material comprises a piezo-ceramic (column 4, lines 36-37).

9. With respect to claim 21, the combination of Feral et al., Phillips, Inoue et al., and Chandran et al. discloses the ceramic element according to claim 15. Both Feral et al. and Phillips disclose that the element is selected from the group of piezoelectric

transformers or piezoelectric bending transformers (Fig 1 of Feral et al. and title of Phillips).

10. With respect to claim 22, the combination of Feral et al., Phillips, Inoue et al., and Chandran et al. discloses the ceramic element according to claim 15. Feral et al. discloses the method step of arranging the homogenous partial ceramic layers one on top of the other to form a stack (Fig 1). Phillips discloses the step of compacting the stack, the ceramic stack being formed with the ceramic layer (column 4, lines 58-60). Compacting the stack would inherently be part of sintering a ceramic stack.

11. With respect to claim 23, the combination of Feral et al., Phillips, Inoue et al., and Chandran et al. discloses the ceramic element according to claim 22. Phillips discloses that ceramic green films with a green ceramic are used as the homogenous partial ceramic layers (column 4, lines 32-47).

12. With respect to claim 24, the combination of Feral et al., Phillips, Inoue et al., and Chandran et al. discloses the ceramic element according to claim 22. Feral et al. discloses that the step of compacting the stack includes laminating (Fig 1).

13. With respect to claim 25, the combination of Feral et al., Phillips, Inoue et al., and Chandran et al. discloses the ceramic element according to claim 22. Phillips et al. discloses that the step of compacting the stack includes heat treatment of the stack (column 4, lines 58-60).

Allowable Subject Matter

14. Claims 26 and 28-35 are allowed.

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15. The following is an examiner's statement of reasons for allowance. The prior art does not disclose or suggest "the further ceramic layer being a diffusion barrier layer for volatile components of lead zirconate titanate" in combination with the remaining claim elements of claim 26. The prior art does not disclose or suggest "a diffusion barrier for volatile components of lead zirconate titanate, the diffusion layer comprised of i) a second electrode layer arranged on a lowermost surface of the homogenous ceramic layer, and ii) a further ceramic layer arranged so that the second electrode layer is intermediate the further ceramic layer and the lowermost surface of the homogenous ceramic layer" in combination with the remaining claim elements of claim 28.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

16. Applicant's arguments with respect to claims 15-26 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Shimabara et al. (JP 200-012375) discloses a multi-layer piezoelectric device having further ceramic layers that acts as diffusion barrier layers.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek J. Rosenau whose telephone number is 571-272-8932. The examiner can normally be reached on Monday thru Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Derek J Rosenau
Examiner
Art Unit 2834

DJR
6/27/2007


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